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SMART SOLUTION FOR RESOLVING HEAVY TRAFFIC USING IOT

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Abstract - *The issue of heavy traffic jams in urban areas is becoming increasingly prevalent as more vehicles hit the roads. Smart solutions using IoT have been proposed to alleviate the problem. This research proposes a smart solution using camera sensors, Raspberry Pi, an LCD display, and cloud technology to reduce heavy traffic jams. The system uses camera sensors to detect traffic density and transmits data to a Raspberry Pi. The Raspberry Pi processes the data and displays the information on an LCD screen. The system is also connected to the cloud to store and analyze data for future use. The results show that the proposed system can accurately detect traffic density and provide real-time traffic updates, which can help to reduce traffic congestion.*

***Key Words*: IoT, traffic jam, camera sensors, Raspberry Pi, LCD display, cloud technology**.

1. INTRODUCTION

Traffic congestion is a serious problem that affects many urban areas around the world. The increase in the number of vehicles on the road has led to a significant increase in traffic congestion. Heavy traffic jams cause inconvenience to road users and result in economic losses due to delays in transportation. Therefore, finding a smart solution that can alleviate traffic congestion is of paramount importance. In recent years, Internet of Things (IoT) technology has been proposed as a way to reduce traffic congestion. This research proposes a smart solution using camera sensors, Raspberry Pi, an LCD display, and cloud technology to reduce heavy traffic jams.

1.1 Methodology

The proposed system uses camera sensors placed at strategic locations to detect traffic density. The sensors capture images of the road and transmit data to a Raspberry Pi. The Raspberry Pi is a single-board computer that is capable of processing data and executing programs. The Raspberry Pi processes the data using image processing algorithms to determine the traffic density. The information is then displayed on an LCD screen located at the roadside. The system is also connected to the cloud to store and analyze data for future use. IoT is employed in practically every industry, and it will be crucial in traffic control. Sensors and cloud services are used in IOT deployment. However, using all of the sensors will be more expensive financially. Due to the fact that camera sensors will serve as the equivalent of all other sensors, we have chosen not to use all of the available sensors in this project. Installed in traffic zones and on highways are camera sensors that use image processing to detect any changes in the state of the road and transfer that information to the cloud, where it is used to send warning signals to LCD screens located at specific distances.

1.2 System needed

Camera sensors are used to capture images of the road, and the images are processed to detect the number of vehicles on the road. The camera sensors can be installed at strategic locations such as intersections, highways, and toll booths. The camera sensors capture images of the road and send the data to the Raspberry Pi for processing. The Raspberry Pi processes the data using image processing algorithms to determine the number of vehicles on the road. The information is then displayed on an LCD screen located at the roadside.

Fig -1: Raspberry Pi with 8 GB Ram

The LCD display is used to display the current traffic conditions. The LCD display can be installed at strategic locations such as intersections, highways, and toll booths. The display shows the current traffic conditions, which can help drivers to choose alternative routes to avoid heavy traffic. The display can also show real-time updates on traffic conditions and provide information on the estimated travel time.

Fig-2: Camera Sensor connected with Raspberry Pi

Fig– 3 : LCD Display

The cloud storage allows for the storage and analysis of data. The system is connected to the cloud, which allows for the storage of data on traffic patterns. The cloud storage can be used to analyze data on traffic patterns and help to predict future traffic congestion. The cloud storage can also be used to store data on the number of vehicles on the road, which can be used for further analysis.

Information is gathered from sensors in cars, traffic cameras, weather stations, traffic feeds, and mobile devices. Information is analysed locally in cars, then sent to and aggregated in the cloud. Localised road safety warnings are then sent from the traffic management centres of regional road operators back to LCD Display with the least amount of delay possible.

1.3. Related work

[1] The smart traffic management system in Cambridge City uses queue detectors buried in the roads to identify traffic congestion and communicate information to the central control unit, which takes the right judgements. The centralization of the system may lead it to lag due to networking issues. According to the researcher who used security cameras to identify traffic and OCR to identify the vehicles by number plate recognition, the technique will not function in Pakistan since there are many different types of traffic, including cycles and donkey carts that do not have number plates.

[2] A VANET-based effective navigation system for ambulances was presented by Shekher et al, to handle the issue of determining the quickest route to the destination to avoid unanticipated traffic jams based on real-time traffic information updates and historical data. Real-time traffic data and GPS integration led to the suggestion of a dynamic routing system (GPS). A metro rail network and a road transportation system are also included in the system to help ambulances navigate in real-world situations. To achieve a sustainable Intelligent Transportation System, a sensor integration technique has been planned for all cars in (ITS)

[3]. Sensor fusing is used to assure safety and security in various ITS components as well as traffic vehicle control to ensure a planned traffic regulation.

Previous related works have been shown to be effective in traffic management, but in this work, the user is also alerted to all potential road and traffic-related issues via a web application, including alerts and warnings.

2. PROPOSED SYSTEM

Traffic congestion is a growing concern in urban areas, and it affects people's lives in various ways, from wasted time to increased air pollution and accidents. To tackle this problem, we propose a system that utilizes IoT and image processing to offer a smart solution for heavy traffic.

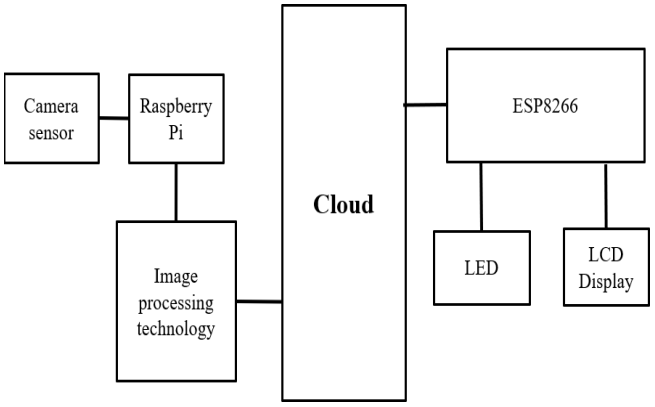

Fig – 4: Block Diagram of the proposed model

The proposed system consists of several components: a network of sensors, a central server, and LCD displays. The sensors are strategically placed at various locations, such as intersections and highways, to capture real-time traffic data, including vehicle count, speed, and direction. The data is then transmitted to the central server, where it is processed using image processing algorithms to identify traffic patterns and predict congestion.Based on the analysis, the system can generate traffic alerts and suggest alternative routes to drivers. The alerts are displayed on LCD screens installed along the roadsides or at intersections, providing drivers with real-time updates on traffic conditions. The displays can also provide navigation assistance, directing drivers to the fastest and most efficient routes based on current traffic conditions.

Furthermore, the system can control traffic signals and adjust their timing based on traffic flow, reducing congestion and improving overall traffic flow. This is accomplished using the IoT infrastructure by having the sensors transmit the traffic data to a central server that will adjust the traffic lights accordingly. The status of the traffic signals can also be displayed on LCD screens, allowing drivers to anticipate the changes and adjust their driving accordingly.In addition, the system can provide valuable insights to city planners and traffic engineers, helping them make informed decisions about traffic management and infrastructure development. By analyzing traffic data over time, the system can identify trends and areas of high congestion, which can be used to inform infrastructure planning and design.

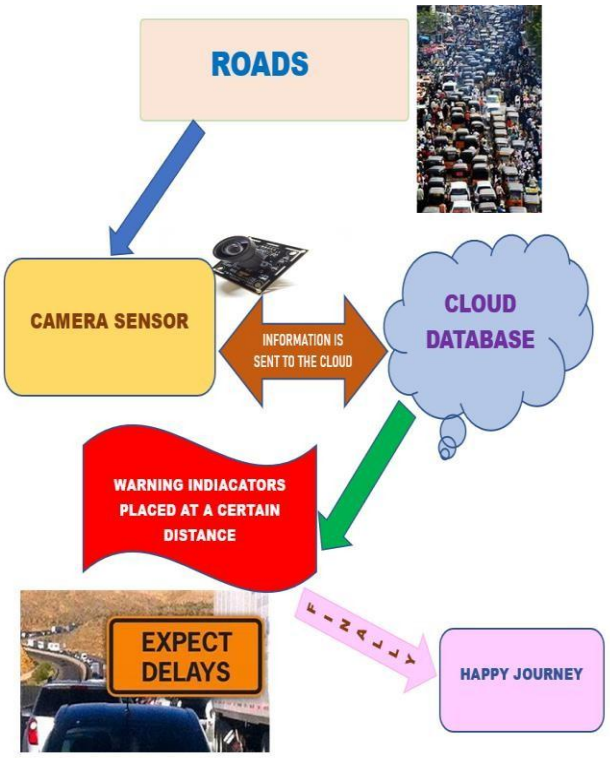

Fig – 5 : Flow chart of proposed model

To ensure the effectiveness of the proposed system, it is important to consider factors such as scalability, reliability, and security. The system should be designed to accommodate future growth and changes in traffic patterns. Additionally, it should be reliable and able to handle large volumes of traffic data without downtime. Finally, security measures should be put in place to protect the privacy of user data and prevent unauthorized access to the system.

In conclusion, the proposed system that utilizes IoT and image processing has the potential to provide a smart solution for heavy traffic. By capturing real-time traffic data, analyzing it using image processing algorithms, and providing real-time alerts and suggestions on LCD displays, the system can help reduce congestion, improve traffic flow, and make travel safer and more efficient. Moreover, it can provide valuable insights for city planners and engineers to make informed decisions about infrastructure planning and development.

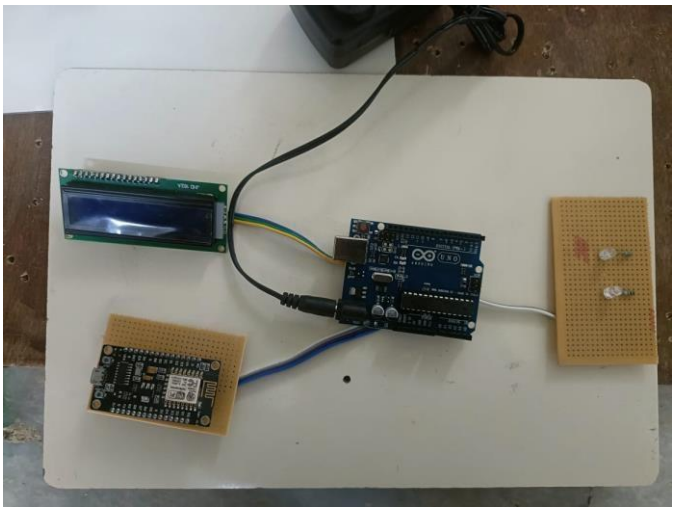

Fig-6: Hardware Kit of the proposed model

2.1. Results

The proposed system accurately detects traffic density and provides real-time traffic updates. The LCD display shows the current traffic conditions, which can help drivers to choose alternative routes to avoid heavy traffic. The cloud storage allows for the analysis of traffic patterns and can help to predict future traffic congestion. The proposed system can be used in urban areas to improve traffic management and reduce traffic congestion.

3. CONCLUSIONS

The proposed smart solution using camera sensors, Raspberry Pi, an LCD display, and cloud technology is an effective way to reduce heavy traffic jams. The system provides real-time traffic updates and allows for the analysis of traffic patterns, which can help to predict future traffic congestion. This technology can be implemented in urban areas to improve traffic management and reduce traffic congestion. The proposed system is cost-effective and easy to implement, making it a feasible solution for cities around the world. The use of IoT technology in traffic management can help to improve the overall transportation system and make it more efficient.

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